“Synthesis, Chemistry and pharmacological evaluation of some new benzothiazole metal complexes”

SHORT RESUME OF THE PLAN PROPOSED FOR INVESTIGATION FOR Ph.D. DEGREE UNDER THE FACULTY OF**SCIENCE**.

TO BE SUMBITTED TO

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

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June- 2019

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Introduction:

In recent years, the number of people suffering from cancer and multidrug-resistant infections has sharply increased, leaving humanity without any choice but to search for new treatment options and strategies. Although cancer is considered the leading cause of death worldwide, it also paves the way many microbial infections and thus increases this burden manifold. Development of small molecules as anticancer and anti-microbial agents has great potential and a plethora of drugs are already available to combat these diseases. However, the wide occurrence of multidrug resistance in both cancer and microbial infections necessitates the development of new and potential molecules with desired properties that could circumvent the multidrug resistance problem. A successful strategy in anticancer chemotherapy has been the use of metallo-drugs and this strategy has the potential to be used for treating multidrug-resistant infections more efficiently. As a class of molecules, Schiff bases have been the topic of considerable interest, owing to their versatile metal chelating properties, inherent biological activities and flexibility to modify the structure to fine-tune it for a particular biological application. Schiff base-based metallo-drugs are being researched to develop new anticancer and anti-microbial chemotherapies and because both anticancer and anti-microbial targets are different, heterocyclic Schiff bases can be structurally modified to achieve the desired molecule, targeting a particular disease. In this review, we collect the most recent and relevant literature concerning the synthesis of heterocyclic Schiff base metal complexes as anticancer and anti-microbial agents and discuss the potential and future of this class of metallo-drugs as either anticancer or anti-microbial agents.

A number of 2-aminobenzothiazoles have been studied as central muscle relaxants and found to interfere with glutamate neurotransmission in biochemical, electrophysiological and behavioral experiments.[1] Benzothiazole ring made from thiazole ring fused with benzene ring. Thiazole ring is a five-member ring consists of one nitrogen and one sulphur atom in the ring. Benzothiazole derivatives have been studied and found to have various

chemical reactivity and biological activity. It was found to be possessing pharmacological activities such as anti-viral, anti-bacterial, anti-microbial and fungicidal activities.[2]Benzothiazole nucleus containing molecules are also reported as anti-allergic,[3]anti-diabetic,[4] antitumor,[5] anti-inflammatory, anti-helmintic, and anti-HIV agents. 2-aryl substituted benzothiazoles show antitumor activity while condensed pyrimidobenzothiazoles and benzothiazolo-quinazolines showed anti-viral activity.[6-7]The medicinal uses and applications Schiff bases and their metal complexes are of increasing clinical and commercial importance. Schiff bases have picked up significance in medicinal and pharmaceutical field because of an expansive range of biological activities like anti-inflammatory[8-11], analgesic[12-15], antimicrobial[16], antispasmodic[17], tuberculosis[18], anti-cancer[19], antioxidants, anthelmintic. Schiff bases are also administered as catalysts, intermediates in organic synthesis, pigments, dyes, polymeric stabilizers and corrosion inhibitors. On reviewing the literature, it is proved that metal complex exhibits greater biological activity as the free organic compounds.

In view of the above considerations it is proposed to undertake a comprehensive study of transition metal complexes fused with benzothiazole employing various physicochemical techniques.

Hence the proposed Research Topic is **“Synthesis, Chemistry and pharmacological evaluation of some new benzothiazole metal complexes”**

Interdisciplinary Relevance:

The present work has a quality interdisciplinary relevance. The proposed research work is regarding biologically& pharmacologically active compounds. So this work may prove beneficial for human being.

Review of research & development in the subject :

a) International Status :

Development of small molecules as anticancer and anti-microbial agents has great potential and a plethora of drugs are already available to combat these diseases. However, the wide occurrence of multidrug resistance in both cancer and microbial infections necessitates the development of new and potential molecules with desired properties that could circumvent the multidrug resistance problem. A successful strategy in anticancer chemotherapy has been the use of metallo-drugs

and this strategy has the potential to be used for treating multidrug-resistant infections more efficiently.

Heterocyclic compounds containing nitrogen and sulphur possess potential pharmacological activities[20-22]. 1,2,4-Triazines and their derivatives have been widely studied in terms of their synthetic methodologies and reactivity since some of these derivatives were reported to have promising biological activities like A1 Adenosine receptor antagonists[23], Age-related macular degeneration, analgesic, anti-inflammatory activities, Anticancer Activity, anticonvulsant activity, antimicrobial activity, antinociceptive activity, Antiproliferativeactivity, anxioselective agent, Kinase inhibitor activity, Muscle Relaxant activity. Caputo et al[7] synthesized two sets of benzothiazole derivatives bearing at C-2 an aryl amide or an aryl urea moiety and evaluated in vitro primary anticancer assay against a panel of 60 human tumor cell lines.

b) National Status :

In recent years, the number of people suffering from cancer and multidrug-resistant infections has sharply increased, leaving humanity without any choice but to search for new treatment options and strategies. Although cancer is considered the leading cause of death worldwide, it also paves the way many microbial infections and thus increases this burden manifold.The medicinal uses and applications Schiff bases and their metal complexes are of increasing clinical and commercial importance.

Ram Vishnu[24] reported one pot synthesis of dinitro-1,2,4-triazino [3,2-*b*] benzothiazole-2-one shows antibacterial activity. Numerous papers have shown that the benzothiazole nucleus possesses a potent anticancer activity against human cancer. Desai and co-workers[25] synthesized 2-(4-methoxy/2-methyl phenyl)-4-phenyl acetyl hydrazino-6-isonicotinyl hydrazino-s-triazines and tested them for their anti-HIV activity against susceptible human host cell (CEM cell line) over a wide range of concentrations. Benzothiazole nucleus is found significance in medicinal and pharmaceutical field because of an expansive range of biological activities like anti-inflammatory.

Aims &Objectives :

1. To study the coordination behavior of newly synthesized substituted Benzothiazole with transition metal ions.
2. To prepare their metal complexes.
3. Characterization of metal complexes by various techniques.

4. To study percentageComposition, meltingand boiling points.

5. To study biological and pharmacological activity of newly synthesized Compounds.

Methodology :

1. To synthesize several derivatives of benzothiazole by multicomponent reactionand their metal complexes.

2. To Study spectra of new derivatives of benzothiazole and their metal complexes.

3. To evaluate biological & pharmacological activities of newly synthesized compounds.

4. To study elemental analysis, magnetic susceptibility and Melting point /Boiling point.

Year wise plane of work & target to be achieved.

The proposed project work requires a period of at least three years

Year wise distribution of work

i) First year :

Review of literature & preparation of new derivatives of benzothiazole& its Schiff basesby multicomponent reaction.

ii) Second Year :

Preparation of new benzothiazolemetal complexes.Structural elucidation of newly synthesized compounds by various spectroscopic techniques.

iii) Third Year :

Biological& pharmacological studies of newly synthesized derivatives, tabulation of data obtained & submission of final synopsis.

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To,

Dy. Registrar

P.G. Scetion

S.R.T.M. University Nanded.

Sub : Submission of my Synopsis

Ref : PG/Allocation / 2018-19 dated 29.04.2019

Through : Dr.Chidrawar A. B.(Associate Professor& HOD),Degloor College,Degloor

Respected Sir,

With reference to the above cited subject I am here by submitting the synopsis of my research topicin the subject **Chemistry** (Science & Technology) with consent from my allocated Research supervisor **Dr.Chidrawar A. B.**AssociateProfessor Dept. of Chemistry, Degloor College, Degloor Dist. Nanded and for further action.

So kindly accept the same and oblige.

Research supervisor **: Dr. Chidrawar A. B.** (Associate Professor)
Dept. of Chemistry, Degloor College, Degloor

Research Centre **:**Dept. of Chemistry, Degloor College, Degloor

Your's faithfully

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To,

Dy. Registrar

P.G. Scetion

S.R.T.M. University Nanded.

Sub : Submission of Synopsis of myresearch scholar Mr. Mathwale A. S.

Ref : PG/Allocation / 2018-19 dated 29.04.2019

Respected Sir,

With reference to the above subject, I am here by submitting the synopsis of my Ph. D. research scholar**Mr. Mathwale A. S.**in the subject **Chemistry (Science & Technology).**

Please allow the research work of Ph. D. under my guidance.

So kindly accept the same and oblige.

Your's faithfully

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